School of Advanced Airpower Studies
National Application of Aerospace Power
Thesis

"AIR FORCE LOGISTICS: MOVING FROM A MOBILIZATION BASE TO ONE OF MOBILITY"

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Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JUN 1994	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
"Air Force Logistics: Moving From A Mobilization Base to One of Mobility"	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Air University Press Maxwell AFB, AL 36112-6615**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**63**	

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About the Author

Major Brad D. Lafferty earned his BGS in Communication from Ohio University and his MA in Communication from Arizona State University. He was commissioned through the Air Force Officer Training School and is a graduate of Squadron Officer School, Air Command and Staff College, and Armed Forces Staff College. A command-level logistician, he has served at the Headquarters of Strategic Air Command and Tactical Air Command, as well as three Pacific theater overseas tours. A former instructor at Ohio University and Arizona State University, Major Lafferty is currently enrolled in the School of Advanced Airpower Studies, Maxwell Air Force Base, Alabama.

Dedication

To Robbie, who planted the seeds for this thesis so many years ago.

Executive Summary

Global Reach/Global Power calls for the Air Force to be capable of projecting its forces anywhere, any time. The current logistics vision, however, is based in mobilization rather than mobility. Mobilization focuses on industrial production to provide weapon systems and is long-term oriented; mobility focuses on the process of moving war material to a theater of operations for combat and is short-term oriented.

This paper examines historical examples in two categories: acquisition of airpower assets and adoption of civilian management techniques. These examples illustrate how Air Force logistics developed a bias towards mobilization over three distinct phases and was influenced in its methods and practices by the evolving military-industrial complex. This bias has created an imbalance which the Air Force must shift towards an emphasis on mobility.

The paper concludes with four suggested strategies to effect this shift: three-level wing combat ratings, self-contained 30-day War Reserve Spares Kits, integration of civilian express shipping technology, and application of Total Quality Management to mobility paradigms.

Chapter 1

Introduction

"Always presume that the enemy has dangerous designs and always be forehanded with the remedy. But do not let these calculations make you timid."

Frederick the Great

In 1927, the Ford Motor Company opened the Rouge Plant in Dearborn, Michigan. The plant complex gathered raw materials (coal, iron ore, sand, etc.) at the site and manufactured components which it assembled into the finished Model A automobile. Ford designed the process so that everything took place at the Rouge plant. Less than seventy years later, the Rouge plant is still operating, although by way of a much-transformed process. Now, Ford ships automotive components from manufacturing plants throughout and outside the United States for final assembly at the plant.[1] For Ford, the concept of logistics has evolved from supplying raw materials to one manufacturing point to a choreographed dance where component parts from around the globe arrive at a myriad of assembly lines at just the right moment to insure smooth assembly without depending on massive warehoused stock.

This example points to an obvious truth: industrial logistics has evolved away from the steady mobilization of raw materials from their source to a point of production. Now the emphasis is on a balance between mobility and mobilization, where it is just as important to move the right materials effectively and efficiently as it is to manage the source of that material. Unfortunately, it is a balance that Air Force logistics has yet to establish. Although it has to move materials globally, with precise timing in response to contingency operations, Air Force logistics still focuses on mobilization over mobility, to its detriment. In the 1990 White Paper, "The Air Force and National Security: Global Reach -- Global Power," the Secretary of the Air Force outlined the vision on how to

project airpower globally in response to aggression and National Command Authority directives.[2] In order to realize this vision, we must shift our logistics focus to achieve Global Reach -- Global Power.

Thesis Statement

Logistics support in the Air Force is composed of two facets: mobilization and mobility. Over time, the Air Force has favored mobilization, which overshadowed mobility and created an imbalance in logistics policy. This trend can be attributed to 1) a desire to acquire airframes, supporting equipment, and bases (thus legitimizing an independent, nuclear-oriented Air Force); and 2) civilian industrial management concepts and techniques that the Air Force adopted. To effectively support the Global Reach/Global Power vision, the Air Force now needs to shift its focus to mobility, thus creating a needed balance between mobility and mobilization. To do this, it must institute organizational changes in Air Force logistics activities that affect
mobility, to include depot level maintenance and War Reserve Spares Kit management. Second, the Air Force must adopt current civilian technologies and methods, to include express shipping technology and Total Quality Management techniques, to solve existing mobility problems.

Overview

To support the above theme, this paper will use the following methodology:

-- Historical examples

-- Analysis

-- Suggested strategies

The historical section will present examples of logistics support actions that illustrate the impact of mobilization versus mobility on Air Force operations through three separate time periods. In the analysis section, we will examine how these examples show the advantages and disadvantages of favoring mobilization over mobility. In particular, the analysis will point out how, over time, this emphasis has worked more and

more to the Air Force's detriment. Finally, in the last section, we will look at some proposed strategies whereby the Air Force can shift its focus and increase its strength in mobility-oriented logistics support.

Before examining why the Air Force has traditionally favored mobilization over mobility, logistics thinkers need to understand just what these two terms mean. This paper uses the following definitions of the terms:

> *Mobilization*: The process whereby a nation moves its industrial base to one of war material production either to prepare for or to sustain national involvement in a war.
>
> *Mobility*: The process whereby war materiel is readied for movement and transported to the theater of operations.

With these definitions in mind, we are ready to explore the historical context within which the logistics balance favoring the production over movement developed.

Notes

[1]Latendresse, C.R.. Research Center Assistant, Henry Ford Museum. Personal letter, 13 April, 1993.

[2]Department of the Air Force White Paper, The Air Force and National Security: Global Reach -- Global Power, (Washington D.C: Department of the Air Force ,June 1990).

Chapter 2

Historical Background

As a nation we were not prepared for World War II. Yes, we won the war, but at a terrific cost in lives, human suffering, and material, and at times the margin was narrow. History alone can reveal how many turning points there were, how many times we were near losing, and how our enemies' mistakes often pulled us through. In the flush of victory, some like to forget these unpalatable truths.

H. "Hap" Arnold

The main problem with analyzing airpower logistics -- or any logistics, for that matter -- is that the subject tends to be somewhat on the dry side. There aren't many thrilling anecdotes or suspenseful moments because logistics action unfolds over time. Yet in a military world filled with spine-chilling tales, logistics is the grammar of the war story and is as significant to airpower as grammar is to language. In this section, we will examine a series of historical examples that serve to illustrate how mobilization has outweighed mobility when it comes to the business of putting steel on target.

The selected historical examples cover two areas. The first area focuses on how the Air Force acquired acquisition of needed assets to justify the its independence and to maintain its power in relation to the other services. The second area deals with the adoption of civilian management concepts and techniques by Air Force logistics agencies. Within these two areas, we will then look at three phases of historical development in the military-industrial complex that has supplied both the equipment and civilian management techniques the Air Force adopted. These phases include 1) a Codification Phase (the 1950s), 2) an Institutionalization Phase (the Kennedy\Vietnam Years), and 3) a Divergence Phase (post-Vietnam).

To establish a proper framework within which to fit the historical examples, it is important to understand what characterized each phase and how it evolved. The following discussion lays the historical foundation for the codification,

institutionalization and divergence phases of the military-industrial complex as they impacted Air Force logistics.

Codification Phase

Prior to and throughout the 1950s, World War II mobilization practices codified into an industry/military strategy that we used to fight the Cold War. It was a period when both civilian industries and, subsequently, Air Force logistics made great strides using quantitative methods and systems analysis. Unfortunately, the strategy emphasized industrial production over logistical mobility.

"Codification" means arranging or systematizing procedures or conduct. However, the codification of our logistics strategy developed informally. During World War II, there was a 1943 "Logistics Manual," but the manual just contained planning tables of supplies and equipment. There was no airpower logistics doctrine written down at the time.[1] The informal procedures the Army Air Forces used had begun with the War Industries Board (WIB), which was an agency that controlled military planning and spending during World War II. It was made up of key civilian industrialists and some military planners. Many of these civilian WIB members were also potential contractors, which would become more significant in the ensuing phases of military-industrial cooperation. Based on the latter's influence, the Army Air Forces organized its procurement practices along civilian lines.[2] It adopted civilian procedures, which were based on rational/scientific management theory. This theory focused on getting the greatest product output possible, or what is now called productivity enhancement.[3] At the same time, civilian industry also relied on management process methods. This methodology assured that if management staff analyzed functions like planning, organizing, controlling, commanding and coordinating, they could come up with general management principles that would apply under any circumstances.[4] Thirdly, in the name of efficiency, early civilian management theory emphasized centralized control and rigid hierarchical lines. All three of these concepts found their way into military logistics

practices. Centralized and hierarchical control, for example, appeared in top-down planning. Military planners at the headquarters level made up strategic and tactical plans; logisticians weren't included. Once this "product" was finished, only then did planners make up a "grocery list" of logistics requirements, almost as an afterthought.[5]

This codification of civilian practices worked in World War II because the United States had time to mobilize. Before the war, we had no armaments industry, but as Dwight D. Eisenhower said, "American makers of plowshares could, with time and as required, make swords as well."[6]

After World War II, industry moved into quantitative analysis, and once again the Air Force followed its example. Quantitative analysis began with Frederick W. Taylor, who said that an organization should focus on analyzing operations, not just performing them.[7] General H.H. Arnold adopted this approach for the Army Air Forces as early as 1942, and continued its use after the war.[8] Proponents of quantitative analysis used game theory, experimental design, inventory control, and simulation theory to study logistics systems.[9] But what really tied the Air Force into quantitative analysis was its liaison with the Rand Corporation.

Rand became the computer industry leader in the 1950s. It bought out the two companies that had developed UNIVAC and, after a 1955 merger with Sperry Corporation, it became the nation's leader in computer technology.[10] Eager to use this new technology, the Air Force established Project RAND for long-range, quantitative studies of aerial warfare.[11]

The Air Force's liaison with RAND welded airpower logistics to quantitative analysis. This development typified the military-industrial relationship that would later become institutionalized as the military-industrial complex.

Institutional Phase

The continued growth of the U.S. arms industry throughout the 1960s and early 1970s led to a new relationship between the Air Force and the industries that supplied it.

Termed the "military-industrial complex" by President Eisenhower in his 1961 farewell address to the nation,[12] the new relationship formally recognized that supplying armaments not only occurred during wartime, but was an ongoing and permanent peacetime requirement as well. This permanence led West Point scholar and professor Major Robert K. Griffith, Jr. to summarize the new phase as follows: "The military-industrial complex is more than an issue. It is an institution."[13]

The continued Russian threat meant that the U.S. Air Force had to rely on the military-industrial complex to supply itself with alert-ready weapon systems.[14] Given the growing influence of the military-industrial complex, both its technologies and methods appeared in Air Force logistics practices, as later historical examples will bear out.

As the U.S. armaments industry flourished, so did the military-industrial complex.[15] Even though many industries reconverted to civilian production after World War II,[16] the Cold War kept military production going, starting with Korea. Military capability, including Air Force logistics, rapidly declined after World War II and had to be rebuilt. Once rebuilt, Cold War defense requirements kept production growing. By the time the Vietnam War was underway, the military-industrial complex was a permanent feature of the defense landscape. The industries vying for lucrative defense contracts ranged from aerospace industries to electronics firms to motor companies. Their methods of doing business invariably influenced the Air Force as well.

Systems analysis was now the quantitative management tool used in civilian industries, and the Air Force adopted it as it had earlier quantitative methods. Secondly, many of the scientists who had worked with both military and industry during World War II remained within the military-industrial complex. They married quantitative approaches with scientific method[17] and thus further influenced the Air Force. Civilian industry further influenced the Air Force because, like the WIB era, key industrialists

held influential government positions, and they came from industries that advocated systems analysis.

This civilian influence is best illustrated by the career of Robert S. McNamara. Following World War II, Henry Ford II assembled a group of ex-Air Force officers to implement systems-based management control at Ford Motor Company. McNamara was one member of that group.[18] McNamara's Air Force service, combined with his successful application of systems analysis at Ford, completed a loop that saw the Air Force embrace this civilian management technique. According to McNamara, the Department of Defense needed systems analysis because of the size and complexity of the problems it faced. Such problems, he asserted, were too broad, and the number of solutions that surfaced were too great for decision-makers to rely only on their intuition or past experience.[19] McNamara thus empowered the Office of Systems Analysis (OSA) to base procurement programs on a costs-benefits basis, which it did. In one case, the Air Force and Navy analysts in the OSA combined the acquisition of the C-5A with the acquisition of the Fast Deployment Logistics Ship (FDLS). From a costs-benefits standpoint, the OSA analysts contended that improved strategic transportation capabilities could be achieved only through combining both programs. Though Congress delayed the procurement of the FDLS, it funded the Air Force's C-5A.[20]

Ultimately, McNamara's programs only reinforced the military's preference for mobilization-oriented logistics, such as steady-state resupply through a slow logistics pipeline. As the Kennedy/Vietnam years institutionalized the military-industrial complex, they also institutionalized a logistics base that presupposed long lead times and discounted surge requirements in war. (The latter, after all, did not occur in civilian industry.) But soon two changes would characterize the Post-Vietnam divergence between real-world conditions and Air Force logistics practices: foreign market competition for civilian goods and the end of the Cold War.

Divergence Phase

The late 1970s and early 1980s saw a widening gap between how the military-industrial complex was did business and how the rest of the world operated. Following the conclusion of the Vietnam War, defense reductions, coupled with expanding foreign consumer-based industry, drove the wedge. Of additional impact was the change in foreign industry's management techniques, which increased the quality of their products. The gap became critical when the end of the Cold War changed the nature of the U.S. security threat. In order to understand how this gap developed, we must examine the conditions that led to this divergence.

In 1983, the Pentagon was the biggest single purchaser of goods and services in the United States.[21] One out of every ten Americans worked a job that was directly or indirectly tied to the defense industry.[22] The military-industrial complex employed 30% of the country's mathematicians and one-fourth of its scientists and engineers.[23] The military-industrial complex had reached this point in three stages. First, Cold War spending had pulled America out of the recession that immediately followed World War II, and at a time when the U.S. had the only intact economy, its industry seemed capable of producing both guns and butter. Second, in the 1950s and 1960s, many defense projects bolstered civilian production as well, from jet airliners to automated machine tools.[24] And finally, the Vietnam War increased the growth of both defense spending and the military-industrial complex. But this emphasis on defense exacted a price.

Foreign competitors were edging out leading U.S. civilian industries -- the bulwark of the military-industrial complex -- in the struggle to dominate civilian markets. The Los Angeles Times stated that "...the military-industrial complex has eroded this country's ability to compete with Japan and other industrialized nations in non-defense markets and to apply advanced technology in consumer areas."[25] Japan was a prime example, surging ahead in computer technology and electronics.[26] And much of that nation's industrial success was tied to new ways of doing business. For example, Total

Quality Management, adopted by the Japanese in 1950, enabled them to focus on quality in every part of the manufacturing process.[27] The result was steady and significant improvement in Japanese products that threatened U.S. industry in key areas.

Here in the United States, civilian logistics was undergoing a change. Businesses like United Parcel Service, Emery Air Freight and Federal Express developed innovative and responsive ways of transporting and tracking air shipments. The shift was toward mobility, but Air Force logistics had yet to get on the bandwagon, despite the end of the Cold War.

The fall of the Soviet Union and the end of the Cold War significantly altered the threat facing the United States. With the danger of nuclear war now greatly reduced, the Air Force is now more likely to fight in contingency operations like the Gulf War. Such wars require Air Force logisticians to deploy air wings anywhere in the world and ensure they are able to fight until efficient resupply begins. These requirements demand a mobility-capable Air Force rather than a mobilization-oriented one that grew out of the military-industrial complex. The military-industrial complex has lost touch with both world changes and management requirements and objectives. Currently, the U.S. military, and the Air Force, are tied to a logistics system that is outdated in its misplaced emphasis on mobilization.

We move now to the historical examples of acquisition of airpower assets and adoption of civilian management concepts/techniques. These examples illustrate how Air Force logistics policies either reflected a preference for mobilization or mobility practices during each of the above three phases. In order to clarify the relationship between mobilization and mobility, the examples for each phase are paired. The first cites a set of events that supported the concept of mobilization during that particular phase. The second describes circumstances that negatively impacted mobility during the same phase.

Acquisition of Airpower Assets

Codification Phase

Weapon System Approach to Buying Aircraft: How the acquisition of airpower assets supported the concept of mobilization during the codification phase of the military-industrial complex.

Following World War II, the United States adopted a nuclear strategy to deter war with the Soviet Union, then seen as the primary threat to national security. The preeminence of nuclear doctrine and the Air Force's continuing role in maintaining nuclear primacy led to the modification of existing airframes and the acquisition of new ones to support the nuclear mission. To a degree, the mission presumed some mobility in launch platforms that had to move to a theater of operations at a moment's notice. But in fact, our nuclear strategy was essentially a mobilization strategy because it focused primarily on war material production to prepare for a conflict which was expected to be relatively short. As a result, this mobilization approach affected how the Air Force acquired the weapon systems to support its nuclear strategy.

By the late 1950s, the Air Force had moved to a weapon system approach in buying aircraft. This meant that when the Air Force added a new airframe to the inventory, they would plan simultaneously to acquire everything needed to support that aircraft, from spare parts to munitions. This worked logically in two ways. First, it assured that everything needed to operate the weapon system would be in place when the system became operational, a must for it to be a significant deterrent. Second, this acquisition approach gave total control over all aspects of system acquisition to the user. From a political perspective, this also appealed to an Air Force that had been an independent service for only about a decade and whose leaders still remembered the Army as the final arbiter for acquisition. The weapons systems approach was an ideal

way to avoid parceling out any portion of airpower (at least as it related to the aircraft itself) into non-Air Force hands.

However, from a practical standpoint, a problem arose regarding spare parts acquisition. Lead times for weapons systems production were running anywhere from one to three years. This meant that parts buying decisions had to be made far in advance of the weapon system actually coming on line. The Air Force didn't have any idea what breakage rates for each part might be, or how long each part could be expected to last.[28] When queried as to the best way to address spare parts acquisition, a Project RAND study recommended a hand-to-mouth buying approach. Once the weapon system became a part of the operating inventory, the Air Force acting on the RAND recommendation, purchased parts on an as-needed basis. It was more cost-effective than guessing and possibly overstocking aircraft parts.[29]

However, this approach hinted at two Air Force/military-industrial complex assumptions. First, since it did not distinguish between nuclear and conventional platforms, it assumed future conventional conflicts would either allow time to build a spare parts inventory to support the Air Force in a conflict, and flow additional parts to the theater, or would escalate into nuclear war, negating the need for either mobilization or mobility.

Still, the immediacy of nuclear response engendered an awareness of the need for mobility. During the 1950s, two Air Force major commands looked at mobility requirements, with different results.

Early SAC and TAC Mobility Efforts: How the acquisition of airpower assets negatively impacted mobility during the codification phase of the military-industrial complex.

Even before the Korean War, Strategic Air Command (SAC) was considering mobility. The national strategy tasked SAC to maintain units ready to perform

conventional strategic bombing anywhere on the globe, even though their primary mission was nuclear. In July of 1950, in response to hostilities in Korea, SAC used its mobility plans to get the first medium bomber groups swiftly to Kadena, their base for strikes against Korea. Under these plans, the bomber groups' flyaway kits contained only enough support equipment and spare parts for 30 days' operation with minimum base support in a deployed location. Perhaps SAC planners had considered this sufficient because they assumed a nuclear conflict would be brief and any conventional war would allow time for strategic mobilization, as had World Wars I and II.

The Air Force also knew after World War II that mobility would be equally vital for tactical units. Tactical Air Command (TAC), under Continental Air Command, had mobility goals, but Congress had not appropriated funds to support a mobility program. The Air Force was focusing its spending on nuclear assets both because the nuclear airpower mission strengthened the newly-independent Air Force and because they considered the nuclear strategy more cost-effective. As a result, units under TAC control, like night photography reconnaissance units, technical reconnaissance units, and tactical communications and control squadrons, still used support equipment that was too heavy to be shipped via B-26s. So while SAC was able to move assets swiftly to the Pacific theater by air, TAC had to surface ship everything -- and a great deal of the more fragile equipment was damaged during the voyage.

So the tactical support in terms of tactical reconnaissance, night photography and communications equipment reached Korea in October, in response to an urgent request by the Far East Air Force for a July arrival. SAC had moved its bombers toward a limited mobility mindset, but TAC was still organized for long-term mobilization.[30] The Air Force would eventually suffer the results of this mobility deficiency when it employed tactical forces in Vietnam.

Institutionalization Phase

CASF Logistics Support: How the acquisition of airpower assets supported mobilization during the institutionalization phase of the military-industrial complex.

During the Vietnam era, the Air Force used the Composite Air Strike Force (CASF). Developed in mid-1955, it was nuclear-capable and was not designed for conventional warfare (even though it was made up of tactical aircraft), but could be deployed to a forward location prior to a tactical nuclear strike. Logistics support for the CASF included GRAY EAGLE (later HARVEST EAGLE) kits. These kits contained a combination of housekeeping items such as beds, administrative and messing equipment, and tents. They also contained station sets consisting of aerospace ground equipment (like light carts, tugs, air conditioners and fire extinguishers) and flightline equipment (like munitions racks, stairways and maintenance stands).[31] The kits could sustain field operations for 30 days.

When the Gulf of Tonkin incident occurred in 1964, CASF units deployed to Vietnam.[32] They took 70 percent of their support personnel in-country and left the remaining 30 percent at Clark Air Base. The idea was to perform complex maintenance functions on the aircraft at Clark. But once the 30-day supply of logistics support equipment gave out, Clark became saturated. So did Kadena Air Base, Japan, and the support base in Taiwan.[33]

The system was not sophisticated enough to sustain forward operations.[34] Like the SAC mobility plan for post-World War II bombers, it was designed for a nuclear-capable force whose potential conflict would be of short duration. Air Force conventional logistics plans were still mobilization-based. As the conflict escalated, the logistics pipeline eventually caught up and was able to supply the CASF through the traditional mobilization process, thus reinforcing its applicability. This early effort at

mobility, however, was only temporarily successful because it was not designed for sustained operations.

Problems with Air Force logistics support often originated at the planning level. The next example illustrates how failure to plan for mobility-oriented logistics short-circuited PACAF's operations in Southeast Asia.

PACAF Southeast Asia Plans: How the acquisition of airpower assets negatively impacted mobility during the institutionalization phase of the military-industrial complex.

Prior to the escalation of conflict in Vietnam, Pacific Air Forces (PACAF) had a number of contingency plans in place for limited war in Southeast Asia. These plans contained some attempts to determine the logistics needs for operations in the area, but real-world implementation showed them to be short-sighted.

In 1964, PACAF plans called for 63,000 attack sorties to be flown in 90 days. But starting in April of 1965, it actually took eleven months to fly those 63,000 sorties. In fact, the Air Force did not even have the airlift it needed to move the required 120,000 tons of munitions and consumables needed to fly 63,000 sorties within 90 days. Nor had they planned for logistics ships to meet this need. As a result, by the time they flew 63,000 attack sorties in five months (still well short of 90 days), the plan called for a total of 165,000 sorties to have been flown by that point in time. Logistics couldn't catch up because it wasn't structured to accommodate unprogrammed increases in air operations for large-scale counterinsurgency, but only for slowly built-up mobilization.[35]

Though the overall logistics system performed credibly in Southeast Asia, it did so only because of time and the logistics mobilization pipeline. Thus the mobilization approach was seemingly validated.

The Air Force never solved the logistics planning problems that emerged during the Vietnam War. When the Air Force launched Desert Shield/Storm, it did so with the

same lack of logistics planning as before. The next examples demonstrate how inadequate mobility plans forced Air Force logisticians to rely on unorthodox measures to supply air units in the field.

Divergence Phase

TRANSCOM and Desert Shield/Storm Spares: How the acquisition of airpower assets supported mobilization during the divergence phase between the military-industrial complex and civilian industry.

The most significant military action in the post-Vietnam era is also the most recent: Desert Shield/Desert Storm. The operation stands out for three reasons. First, it was the acid test of the Rapid Deployment Joint Task Force (RDJTF), whose previous actions had been primarily exercises and training scenarios. Second, it tested logistics operations in a manner and degree previously unknown -- it combined the largest amount of cargo moved in one operation over the farthest distances, and involved the first-time activation of the Civil Reserve Air Fleet. But third, and perhaps most intriguing, is that its unique combination of duration and intensity undermined its validity as a baseline to measure logistics success.[36]

The United States enjoyed five and one half months to deploy equipment and personnel without enemy disruption or any loss of airlift assets to enemy action. Further, the host country provided modern airfields and seaports to an extent no other country could be expected to match.[37] And finally, the conflict was of such short duration that it did not truly test the logistic system's ability to sustain a protracted campaign.[38]

In order to place the Desert Shield/Storm examples within an understandable context, it's important to review the auspices under which logistics actions operated. Desert Shield/Storm was the first real test of Transportation Command's (TRANSCOM's) operations under wartime conditions since its inception in October 1987. Composed of Military Airlift Command (Air Force), Military Traffic Management Command (Army)

and Military Sealift Command (Navy), TRANSCOM headquarters's task was to plan, oversee and monitor deployment of troops. Component commanders were to provide aircraft, ships and land transportation.[39]

Though the concept was clear, by 1990 certain basic wartime procedures were not yet in place. TRANSCOM had not developed an operational plan for a Desert Shield/Storm-type contingency because CENTCOM had not developed the operational plan that would drive TRANSCOM to create a corresponding, detailed plan.[40] Another obstacle was that TRANSCOM and its component elements had no agreed-upon wartime operating procedures or lines of responsibility. A third problem concerned the central deployment data base; it was neither complete nor accurate.[41] As a result, TRANSCOM developed specific plans concurrent with the actual operation, publishing transportation schedules simultaneously with (or just ahead of) actual movement of cargo and personnel.[42] It is no surprise that an anonymous TRANSCOM official characterized the initial period of the Persian Gulf operation as "chaotic and undisciplined."[43] And this chaos compounded the problems faces by units working to acquire assets to support operations from a mobilization-based system.

For example, General Accounting Office (GAO) staff visited 16 Air Force units during Desert Shield/Storm to ferret out the viewpoints of on-scene personnel. Though all interviewed stated that they had never missed a mission because of spare parts shortages (and in fact averaged a 93% readiness rate throughout the operation),[44] a combination of ingenuity and parts-swapping was the real reason for success. The success was not due to a smoothly-operating mobility plan.

The GAO also looked at War Reserve Spares Kit (WRSK) effectiveness. They found that although WRSK kits enabled the units to deploy and sustain operations for an initial 30 days,[45] four units did not have WRSK kits ready prior to deployment. These units were based in Europe and were never expected to deploy out of the European theater during wartime. Their WRSK was assembled from non-deploying units by

depleting bench stock and removing parts from aircraft, leaving those units non-mission capable.[46]

F-15E units faced a similar dilemma, according to their maintenance personnel. Certain F-15E parts, avionics in particular, are specific to that model. The E-model's spare parts had originally been purchased based on engineering studies of estimated mean time between failures. But the aircraft had always failed to meet that failure rate, and wartime use rates increased parts usage. To compound the problem, the first F-15E unit to deploy had on hand only a 26% fill rate for its WRSK. It depleted parts from other units' aircraft, placing seven aircraft in nonoperational status. The second F-15E unit faced similar problems and left 11 aircraft from other units nonoperational. In some cases, parts were actually taken off the assembly line to get units ready to deploy.[47]

Finally, even those units with full WRSKs faced problems. Two Air Force units reported that they were delayed in becoming fully operational because there was not enough initial airlift to transport their WRSK.[48]

The WRSK problems and the airlift delays were examples of a system that presupposed adequate lead time to gather and move parts and equipment. Though existence of WRSK demonstrates a mobility mind-set, the fact that all units that were supposed to have WRSK ready to move did not, and that this operation needed to task units that were not planned for contingency mobility, points to a fundamental reliance on principles of mobilization.

The next Desert Shield/Storm example points out that even when spare parts were available, getting them to the deployed units meant grappling with a supply system that was not designed for mobility.

Desert Shield/Storm Computer-Based Spares Supply: How the emphasis on acquisition of air power assets negatively impacted mobility during the period of divergence between the military/industrial complex and civilian industry.

Though the preceding WRSK example points to a dependency on mobilization, Air Force logistics planners had given consideration to a mobility-oriented wartime computer-based supply system that would keep needed parts moving. Under existing plans, units deployed with their combat supply system (CSS). This enabled them to maintain both accountability and inventory control for WRSK replenishment through a base mainframe computer. Unfortunately, there were connectivity problems early on. As a result, CSS floppy disk updates were either mailed or hand-carried to bases in the United States.

The logistics supply plan also called for deployment of tactical shelter systems (TSSs), including a supply computer. However, the TSSs were never deployed for three reasons. One, the equipment was so fragile that it would have been damaged in shipment. Two, the TSS required too much manpower. Three, there weren't enough TSSs to provide the support needed. The CSS connectivity problem and the missing TSSs demanded a solution as the deployment extended.

In relation to the CSS, Central Command Air Force (CENTAF) developed a solution by regionalizing computer support through the HQ TAC Development Center at Langley AFB, Virginia. By achieving connectivity through a dedicated channel on a dedicated military satellite, they achieved real-time information for spares allocation and distribution for SAC, MAC and TAC.[49]

However, getting the parts earmarked by the now-functional supply system was still a problem. TRANSCOM had created Desert Express, a shipment system reminiscent of Federal Express, which provided two-day delivery of critical items. Desert Express provided delivery to the theater airfields of Dhahran and Riyadh, but getting the right part to the right unit was still problematic. Delivery delays due to mislabeling or sheer volume of aircraft to be offloaded led units to take a more proactive stance.

Some units tracked their critical parts and sent personnel to meet Desert Express flights, rather than relying on in-country transport. One F-15 fighter squadron not only sent personnel to Riyadh to pick up parts, but also had personnel from their home unit drive parts to Charleston, South Carolina, to be placed on the Desert Express, bypassing the Langley supply system. This was not unique to this unit; an A-10 unit also supplemented their daily one-hour runs to Dhahran for parts pick -up with home unit delivery to Charleston.[50] Though the supply system managers were working hard to meet unit mobility needs, personnel on-scene still felt the need to create a supplement/backup plan to maintain their readiness rates.

The preceding examples highlight four decades during which the Air Force favored mobilization-oriented logistics and ignored its mobility requirements. The lack of emphasis on mobility delayed arrival of forces in the Korean theater, reduced the number of combat sorties available in Vietnam, and forced Air Force logisticians to circumvent official supply channels during the Gulf War. However, mobilization-oriented acquisition programs were not the only reason the Air Force gave mobility short shrift. In the next set of examples, we will examine how the Air Force's adoption of civilian management concepts and techniques also helped maintain the mobilization-mobility status quo.

Adoption of Civilian Management Concepts/Techniques

Codification Phase

Sabre Jets in Korea: How the adoption of civilian management concepts/techniques supported mobilization during the codification phase of the military-industrial complex.

Sabre jets flying in the Korean War in January 1952 had two key problems. First, the aircraft had only one wing tank, and the pilots were having problems completing their missions without performing dead-stick landings. Sorties were cut back to the bare

minimum while maintenance crews waited for additional tanks. Second, they were also facing delays in spare parts delivery.

Both of these problems stemmed from a single cause: the Air Force had contracted with civilian industry for replacement parts based on a peacetime rate-of-consumption. When the Sabre jets flew in a wartime environment, the missions used more fuel than during training scenarios. More sorties meant that parts broke with more frequency. By February, the spares supply was exhausted, and as a result, the Air Force took stopgap action and bought a year's supply of parts for the jets. Still, the out-of-commission rate didn't improve until the following April.

Apparently no one had thought to plan for a sustained, limited war to cause a surge in needed spares, thus reflecting the thinking found in civilian industry. Once determined, the materials needed for a civilian industry to manufacture a product remained relatively steady for each unit produced; mobilization meant increased production rates over time. The World War II mobilization-based system fit this profile well, and continued into the 1950s. To solve the Sabre jet problems, the contractors merely needed to increase production (or initiate shipment, if they had stocks of spares) to meet the new combat usage rates, using the same mobilization approach that had succeeded in World War II.[51]

The lack of foresight in anticipating spare parts requirements required for wartime surges was not the only problem Air Force logisticians faced in Korea. The next example points out how centralized decision-making hindered supply movements, even after critical parts and equipment entered the logistics pipeline.

Centralized Logistics Decision-Making in Korea: How the adoption of civilian management concepts/techniques negatively impacted mobility during the codification phase of the military-industrial complex.

In the 1950s, centralized decision-making was the rule for civilian and military management. Application of this management concept included logistics. Those at the top made the decisions about what was needed when and where, while those at the bottom did the hands-on movement of supplies.

During the Korean War, airlift was still not a significant player in the movement of military supplies, troops and equipment;[52] nearly everything was shipped. Decisions about shipment composition and flow came from "higher headquarters." Higher headquarters logisticians acted on requests from theater commanders who, in turn, were fed needs from the field. Unfortunately, there wasn't an orchestrated plan on how to flow supplies based on anticipated wartime requirements. Nor was there a feedback loop to let the central decision-makers know when to slow or stop the flow.

Certainly nobody asked the people whose job it was to sort out supplies at the port how much they could handle. Two years after the start of the Korean War, Lieutenant General W.B. Palmer stated, there was so much tonnage at the port of Pusan that cargo handlers had only sorted about 75% of it. Twenty-five percent of the tonnage on hand wasn't yet on any stock record or locator card. Nobody knew exactly what they had or where exactly at the port it was.[53] So even if a shipment contained urgently needed supplies, there was no guarantee that they could be found and sped to the field.

Although mobilization efforts were flowing supplies into the Korean theater, crucial items were mired in a centralized mobilization system that presupposed a long lead time. A mobility plan might have sent those items by what strategic airlift there was (or at the least might have flagged them in some manner for immediate unloading upon arrival at the port and movement by tactical airlift).

By the time the Air Force was conducting operations in Vietnam, a movement towards controlled decentralization allowed quick solutions to the kinds of problems posed at Pusan. Yet a preference for mobilization over mobility still existed. The

following examples point out how Air Force logisticians continued to focus on mobilization practices to the relative exclusion of mobility.

Institutionalization Phase

Systems Analysis and Vietnam Logistics: How the adoption of civilian management concepts/techniques supported mobilization during the institutionalization phase of the military-industrial complex.

By the 1960s, the Air Force had adopted systems analysis and controlled decentralization[54] as used by civilian industry. In 1966, the Operations Analysis Office, Headquarters Air Force, applied systems analysis to study the best way to solve problems involving slow logistics in-theater airlift in Southeast Asia. The analysis revealed that the reason in-country airlift tonnage inside South Vietnam was slow was because the aerial port inventories were low. Cargo was not moving through the ports on a regular basis because the same airframes that regularly moved cargo were being used for emergency resupply of assault and operational ground forces. Thus, the flow of cargo through aerial ports was not steady.[55]

Guidelines provided to airlift managers at the ports enabled them to rectify the problem at the lowest level (controlled decentralization). The result insured that emergency resupply would not disrupt the regularly scheduled in-country logistics airlift and stabilized the cargo flow to aerial ports.

On the surface, it might appear that the destabilizing factor (emergency resupply) was a mobility obstacle in that it involved transporting war material to the theater of operations. Yet closer examination reveals that this is, in fact, an issue more closely associated with sustaining operations -- mobilization -- with assets that already in-theater. Systems analysis provided mobilization solutions to mobilization problems, and controlled decentralization allowed its swift implementation. This successful application

of two civilian management techniques to military dilemmas served to further institutionalize at least these particular civilian management concepts.

The success of mobilization-oriented solutions when required proved to be a two-edged sword in the 1960s and early 1970s. One the one hand, such solutions pointed out that long-term logistics programs were often appropriate in supporting Air Force combat operations. On the other hand, as shown in the next example, focusing only on the successful aspects of mobilization led Air Force logisticians to overlook improvements in mobility.

Logistics Lessons from Vietnam: How the adoption of civilian management concepts/techniques negatively impacted mobility during the institutionalization phase of the military-industrial complex.

One of the side-effects of institutionalization is the inertia that often accompanies it. Unless pressed by compelling dynamics, such as severe economic pressures or radical and successful departures from normal procedures by competitors, the attitude of, "If it's not broken, don't fix it," often prevails.

At the conclusion of U.S. involvement in Vietnam, Brigadier General Paul F. Patch wrote his end-of-tour report, "Southeast Asia Logistics 1964-1971: A Compendium of Significant Lessons Learned." It covered his entire tenure at PACAF Headquarters. In it, the only mobility-related issue addressed was that Special Assignment Airlift Missions should only be used for equipment and supplies that a unit needs immediately to deploy. Everything else related to improving the flow of the logistics pipeline for long-term, sustained support,[56] even though Secretary of Defense McNamara had pushed rapid deployment as far back as 1966 for early intervention to avoid protracted war and the need for mobilization.[57]

Through Vietnam, the mobilization mind-set had met Air Force logistics needs adequately enough that the possibilities of better mobility capability were largely ignored by high-level logistics managers. This condition persisted until the early 1980s, when a

growing awareness of the military's mobility deficiencies caused government and military leaders to apply two civilian management techniques to improve our ability to move our combat forces and their supplies.

Divergence Phase

Task Force Approach and the CMMS: How the adoption of civilian management concepts supported mobilization during the divergence phase between the military-industrial complex and civilian industry.

In the 1970s, "studies" of problem areas were a popular way for civilian industry to attack them and formulate recommendations. As the technique evolved, task forces became very popular in the 1980s. Task forces conducted studies of problems, came up with recommended actions to solve or reduce the problem, and the solutions were implemented (sometimes on a limited or pilot basis). It took time, but usually some progress was made because information was collected, analyzed and acted upon.

Over a 13-month period in 1980-81, the Congressionally Mandated Mobility Study (CMMS) examined strategic mobility. The study was motivated by an Air Force request for funding to acquire the C-X (now the C-17) because they did not have enough airlift capability to move the RDJTF which President Jimmy Carter had established in 1980. Members of the panel found it took 63 million-ton-miles per day to move the RDJTF. The Air Force suffered a 25 MTM shortfall that included mostly bulky and outsized cargo like helicopters and armored vehicles: 27,740 tons or 28%.[58]

At the came time Congress was conducting this study, the RDJTF was conducting exercises like Proud Phantom in mid-1980. Proud Phantom tested the Air Force's ability to deploy a half-squadron into a bare airstrip in Egypt. Moving the four million tons of equipment and 450 people needed to operate and support just 12 fighters took five C-141s and 28 C-5As,[59] graphically demonstrating the massive airlift a full-scale conflict might require. Not surprisingly, the CMMS concluded that the Air Force indeed

needed additional airlift capability to support the RDJTF mobility scenarios. Despite their conclusions, the C-17 was not funded.

The task force approach of the CMMS was successful on the one hand, because it did reveal a strategic mobility shortfall. On the other hand, it failed to solve the problem because it could not act upon its findings, nor could the Air Force, without Congressional approval. The task force technique worked in many civilian industry applications when those on the task force were either empowered to act upon their findings or were fully supported by those who had that power.

Thus, adapting this particular civilian management technique to this particular military question contributed to the RDJTF's forced reliance on sealift (as in Bright Star 1980 and 1981), a mobilization technique which didn't meet the planning requirements of the RDJTF. During Desert Shield/Storm, U.S. forces again relied on sealift to move the outsized cargo.[60] The fact that this mobilization-based method of moving the RDJTF succeeded during the Gulf War does not change the fact that Congress applied the task force technique far differently than civilian industry. In this case, it furthered the reliance on mobilization.

While the CMMS was studying airlift capability, military leaders were implementing a new computer system designed to improve the mobility capability of all the services. For the Air Force, responsible for quick-reaction airlift support, this system would meet the acid test during the Gulf War, with less than optimum results.

JOPS and Desert Shield/Storm: How the adoption of civilian management concepts/techniques negatively impacted mobility during the divergence between the military-industrial complex and civilian industry.

In 1974, the Joint Chiefs of Staff implemented the Joint Operation Planning System (JOPS).[61] Rooted in civilian systems analysis techniques, JOPS operated via a computer system called the World Wide Military Command and Control System

(WWMCCS). Through WWMCCS, each service identifies the various types of units it owns to support operational plans.

To support JOPS, the Air Force developed the Contingency Operation/Mobility Planning and Execution System (COMPES). COMPES contains all the Air Force units and all the different ways they can be combined and listed by Unit Type Code (UTC). COMPES, which interfaces with the WWMCCS computer, contains information on how big each UTC is, how much it weighs, and how many people it contains. Thus, if the JCS wanted to activate PLAN X, someone basically enters the information into the WWMCCS computer, which sorts through the files and produces the equivalent of "This plan requires these Army, Navy and Air Force UTCs. X-number of airplanes/ships are required to carry these people and equipment items. The people and equipment should flow in this order from Day One to Day Whatever." This flow is called the Time-Phased Force Deployment Data (TPFDD).[62]

Upon implementation, systems analysis-based JOPS looked like a highly efficient way to establish the movement of people and assets to the field fast, and it operated well during exercises. Unfortunately, during Desert Shield/Storm, logisticians discovered that the system was not designed to respond to the sheer volume of changes in requirements the theater Commander-in Chief (CINC) needed. On some days, there were as many as six changes in airlift requirements because the theater CINC determined that he needed Unit C sooner than he needed Unit A, no matter what the plan said. Sometimes planes were diverted -- sometimes twice before they landed at a base to be offloaded.[63]

If the logisticians managing airlift had maintained system discipline according to the TPFDD, which said assets don't move until they've been updated in the data base in the new order of priority, nothing would have moved for a month! And this was war, with immediacies civilian computer management systems simply didn't have to deal with -- at least, not on this massive a scale for so long a period of time. So the logistics transporters just shipped people and equipment without logging them into the data base.

Then the airlift system backlogged because too many planes were arriving at Saudi bases at one time and the aerial port personnel on-scene couldn't unload them all at once.[64]

Eventually, logistics specialists rebuilt the data base and created “time slots” for planes to arrive at each base. But mobility as expected was negatively impacted, and the point remains that system analysis, so touted by civilian industry and which had worked well in peacetime and under exercise conditions, was not flexible enough to cope with the rate of change actual war dictates.

Summary

The condition that persists in Air Force logistics today -- favoring long-term weapon system development over the ability to move forces and supplies quickly and efficiently -- did not occur in a vacuum. It evolved over nearly fifty years within a well-defined historical framework. Starting with the Cold War, the need for a large peacetime force, combined with the Air Force's desire for an independent nuclear mission, contributed to the development of the military-industrial complex. The 1960s, in turn, saw unprecedented growth of the arms industry. The Air Force developed a strong dependence on the technology and management practices of civilian industry and helped institutionalize them further. Finally, changing conditions in both the civilian market demands and the nature of threats to national security produced a growing divergence in the 1980s between the military--industrial complex and civilian industry.

Each of these three phases in the evolution of the military-industrial complex -- codification, institutionalization and divergence -- had an impact on Air Force logistics. By citing historical examples from each of the three phases, we have shown how Air Force logistics practices favored long-term weapon systems development (mobilization) over the ability to actually move forces and supplies (mobility).

In the next chapter, we will examine each example closely to determine the relative merits of favoring long-term mobilization over short-term mobility. An analysis

of each will show that Air Force logisticians face a growing problem if they do not redress the imbalance that still exists.

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Chapter 3

Analysis

Order or disorder depends on organization

—Sun Tzu

Thus far, we have shown that Air Force logistics practices developed in three distinct phases: the codification phase of the 1950s, the institutionalization phase of the 1960s and early 1970s, and the divergence phase in the years following Vietnam. Further, the historical examples for each phase point out how Air Force logistics favored mobilization over mobility in two areas: the acquisition of weapon systems and the adoption of civilian management techniques. The next step is to analyze each example, section by section, to determine the advantages and disadvantages of favoring long-term weapon system development over the ability to move forces and supplies. The analysis will touch upon the changing nature of the military-industrial complex, which became increasingly destructive/unresponsive, and thus show that favoring mobilization over mobility became a growing problem over time. From the analysis of examples, we will then indicate key areas where the Air Force can begin to shift its logistics focus towards greater emphasis on air mobility.

Acquisition of Airpower Assets

Codification Phase

During the codification phase of the military-industrial complex, the relationship between the military and industry was symbiotic. Both benefited each other and produced a product that was greater than the sum of its parts. In the 1950s, that symbiotic product was nuclear deterrence. The Air Force in particular benefited from deterrence because industry produced launch platforms that helped solidify its role as an independent service. Industry profited because Air Force needs boosted production. Significantly, the symbiotic relationship between industry and the Air Force favored

long-term mobilization over short-term mobility, with its attendant pluses and minuses for Air Force logistics. When we examine the two examples relating to the acquisition of weapon systems during the 1950s, those pluses and minuses fall into two categories: the impact of nuclear strategy, and spares acquisition/WRSK application.

The Weapon System Approach to Buying Aircraft, and Early TAC and SAC Mobility Efforts: The nuclear strategy of the 1950s viewed mobility as nothing more than the capacity to launch an immediate nuclear strike. As a result, the Air Force focused on obtaining launch platforms -- aircraft and missiles -- to support its deterrent capability. The Air Force added these systems to the inventory over time, as was appropriate, especially given the U.S.'s head start over the Soviets.

In the first example of RAND recommending a hand-to-mouth buying approach, acquiring spares in tandem with the weapons system reflected a mobilization approach to logistics that yielded mobility-oriented results. Buying the whole system, including spares, meant that once on-line, the system was truly mobile in the sense that it was ready to support deterrence. However, the same hand-to-mouth buying approach actually indicated a mobilization mindset. Mobilization requires time, and in this case, either deterrence would succeed and accommodate the as-needed buying of spare parts or the one-shot nature of nuclear war would the render time needed to mobilize an after attack a moot point. The approach was both sound and cost-effective.

On the downside, this short-term approach was not appropriate for all types of conflict. The second example compared the mobility efforts of SAC and TAC in the 1950s, which resulted in SAC having some mobility capability and TAC being denied funding to achieve its mobility goals, impacting its early effectiveness in Korea. SAC's acquisition of 30-day flyaway kits was designed to support SAC weapon systems at forward operating locations in anticipation of nuclear conflict. The fact that the kits sustained SAC conventional bombers in Korea until industrial mobilization at home could support them was an indirect benefit. TAC also needed mobility capability, but it

was not funded because TAC was not nuclear. As a result, TAC forces arrived in Korea late and with damaged equipment, largely because our nuclear strategy led the Air Force to favor mobilization-oriented logistics.

The symbiotic nature of the early phase of the military-industrial complex yielded both advantages and disadvantages to Air Force logistics. Favoring weapons over the ability to support them from anywhere in the world meant that the Air Force had to accept certain limitations in its ability to project power. In the next section, we will see how the changing nature of the military-industrial complex in the 1960s and early 1970s continued to foster an imbalance between mobilization and mobility.

Institutionalization Phase

During its institutionalization, the military-industrial complex continued to favor mobilization. Vietnam was a war of long-term procurement, and required that the Air Force sustain its flying forces steadily over time. With the escalation of conflict came a corresponding escalation in industrial production to support air combat. To a great extent, this approach was a positive one.

Yet during this phase, the relationship between the defense establishment and industry began to shift from a symbiotic one to one that was mutually exploitative. This means that the benefits each side enjoyed from the relationship -- increased arms for the military and increased profits for industry -- became more important than the results they produced.

Composite Air Strike Force Logistics Support and PACAF Southeast Asia Plans: The next example cited inadequate logistics maintenance support for initial deployment of the Composite Air Strike Force to Vietnam. The CASF placed 30 percent of its support personnel at Clark Air Base to perform complex maintenance functions, and Clark, along with two other bases, became saturated because the system was not sophisticated enough to sustain forward operations. In this case, mobilization practices compensated for the inadequate mobility capability of the CASF. Through mobilization,

the logistics pipeline caught up when the CASF's War Reserve Spares Kits ran out and maintenance support bases became saturated. The CASF's attempt at mobility fell short because it was designed to support tactical nuclear strikes. Like the SAC units of the 1950s, its 30-day flyaway kits only anticipated very short-term operations at a deployed location. Its employment in Southeast Asia was a long-term commitment. Since the kits were not designed to sustain support for more than a brief time span, the CASF was forced to fall back on long-term mobilization policies.

Given the length of the Vietnam War, this transition would have eventually occurred anyway. But the transition from mobility to mobilization could have been smoother. The failure was not in the mobility concept per se, but in the limited extent of its application. In this case, a stronger emphasis on mobility (60 or 90 day kits, prepositioned spares, plans for immediate replenishment of GRAY/HARVEST EAGLE kits) might have bought time and possibly avoided saturated support bases. Although Vietnam was a mobilization-oriented war, a greater emphasis on mobility would have made the flow of logistics more effective.

The emphasis on mobilization also illustrates the lack of real-world considerations present in Air Force planning at the time. In the second example, illustrating how PACAF's plans for contingency operations in Southeast Asia did not include a logistics package designed to meet surge requirements, the surge that PACAF's plans called for implied mobility-based logistics support. The huge number of sorties the plan called for demanded a corresponding quantity of spare parts. Ideally, a sufficient number of spare parts should have been in place with the aircraft to sustain operations; resupply should have been prearranged so that no gap in the parts flow could delay combat sorties. Yet the operations were forced to rely on the traditional logistics mobilization pipeline because planners had not considered the airlift support required to move spares and munitions during a surge. The absence of mobility in this case was never completely resolved by mobilization.

To return to the issue of mutual exploitation, such a relationship flourishes between the military and industry when the relationship remains stable. Change threatens the status quo. The maintenance and surge support problems that appeared relatively early in the 1960s pointed out the need to reexamine then-current logistics practices, but despite incidents like those experienced by the CASF and PACAF planners during Vietnam , the Air Force did not examine the relationship in the light of changing needs.

Divergence Phase

One of the more significant characteristics of an exploitative relationship based on mutual gain is a resistance to change. The limitations imposed by this resistance were clearly evident during Operation Desert Shield/Storm. Despite the operation's success, the lack of emphasis on air mobility had a greater impact on Air Force logistics than ever before. Only the brevity of the conflict prevented the logistics support for air combat operations from breaking down in the Gulf.

TRANSCOM and Desert Shield/Storm Spares and Computer-Based Spares Supply: The continued reliance on mobilization-style logistics in the 1980s afforded very few advantages during Desert Shield/Storm. About the only advantages a weapon system development approach provided were to have (barely) enough spares available to support operations, and to have enough transportation (with heavy reliance on sealift and the CRAF) to move assets and personnel to the Gulf in time to fight. And even these advantages depended upon a five-plus months grace period. Logistics during the Gulf War suffered from virtually the same difficulties that beset it in the preceding phases, despite evidence that some mobility capabilities were under development.

For example, in the area of plans, the first example -- citing how TRANSCOM went to war without logistics plans to support CENTCOM operations -- points up that TRANSCOM was interested in developing mobility-based contingency plans. Yet for three years, CENTCOM had delayed it by not providing the operational plans on which

to base logistics support requirements. TRANSCOM's subsequent development of plans simultaneous with the operational employment of forces was fundamentally a repeat of PACAF's Vietnam experience with sortie surge. And its waiting for CENTCOM's operational plans as a driver was a repeat of the pre-World War II "grocery list" approach to logistics -- the Air Force still maintained a "we have time" mentality that was increasingly incompatible with mobility requirements. The absence of a sense of urgency in logistics plans development left TRANSCOM behind the power curve in supporting the Gulf War -- a definite disadvantage that current mobility plans might have alleviated.

Another bad sign was War Reserve Spares Kits/spares support. Tactical forces were still operating with 30-day WRSK, despite evidence as far back as Vietnam that this was inadequate without enough airlift for replenishment. Twenty-five years later, TRANSCOM was unable to provide enough initial airlift for some units' 30-day kits, let alone replenishment. The fact that European units tasked to support a contingency operation did not have adequate -- or in some cases any -- WRSK implied that in case of a conflict in Europe, the Air Force assumed it would have enough time for industrial mobilization to fill that gap. Finally, the F-15E units' seizing of spare parts from other sources illustrated that the Air Force expected future spare parts production to undo the effects of cannibalization -- even for units whose mission was mobility.

In the second example, which outlined how the supply system was jury-rigged and circumvented during the Gulf War, the same problem exists: logistics planners were thinking mobility but implementing mobilization. Mobility demanded immediate information exchange between Air Force units that needed spare parts and the locations providing those parts. The system appeared to be properly designed, but shortfalls in the information exchange system -- connectivity -- slowed the process. What is encouraging is that TAC's solution was, in fact, mobility-oriented. When combined with Desert Express, it alleviated to a certain degree the spares supply problem. But the fix was not totally reliable; only the aggressiveness of the receiving Air Force units in speeding up

receipt of parts and in supplementing the system kept the logistics flow going. At best, it added to the body of information about how future operations might be designed to better support mobility.

Finally, the problems in transporting the TSS equipment to the Saudi Arabian theater during the Gulf War recall similar difficulties faced as far back as Korea. Then, TAC units used equipment too heavy to air ship. In Desert Storm/Shield, the problem was fragility, but the principle remained the same. The Air Force was still supplying some deploying units with non-mobility equipment, relying on time and mobilization to move the assets to the theater.

The above analysis of the historical examples related to weapon system acquisition leads us to conclude that mobilization-oriented logistics practices did produce a number of positive results. For example, hand-to-mouth spare parts buying for 1950s weapon systems was cost-effective and efficient, given the nature of the deterrent mission. Secondly, the length of the Vietnam War lent itself to long-term weapon system development and supply. Finally, a five-month grace period and stop-gap ingenuity enabled Air Force logisticians to cope with a mobilization-based logistics system and forestall a potential parts shortage in the Gulf War. However, these examples clearly point out that greater emphasis on mobility might have resulted, for example, in TAC forces that arrived in Korea on time, tactical forces able to fly all planned Southeast Asia surge sorties, and wings ready to deploy to the Persian Gulf with full WRSK according to a completed TRANSCOM logistics support plan. In the next section, we will analyze the merits the Air Force derived from adopting civilian management techniques to logistics.

Adoption of Civilian Management Techniques

Codification Phase

The symbiotic relationship between the military and industry favored mobilization over mobility through adoption of civilian management techniques as well as through acquisition of airpower assets. And as it produced positive gains for both

parties in terms of nuclear deterrence, so it did in fighting the conventional war in Korea. However, analysis of the two examples from the Korean War point out significant, though not disastrous, disadvantages to adopting civilian practices.

Sabre Jets in Korea and Centralized Decision-Making in Korea: In the first example, which described the problems Sabre jet units in Korea faced when they ran out of combat fuel and spare parts, the lack of spare parts occurred because the Air Force based its purchase on civilian consumption rates. However, in a peacetime economy industry can procure material at a steady rate since the rate of consumption also remains steady. Unfortunately, in wartime, both usage rates and breakage rates rise. In the case of the Sabre jets, it took four months for the Air Force to procure and deliver the needed fuel tanks, thus decreasing/delaying the Sabre jets' combat effectiveness. The advantage of mobilization-oriented logistics in this example is that it enabled the Air Force to adjust production and supply rates and eventually catch up. However, had the Air Force properly anticipated wartime demands, it might have prepared by either stockpiling Sabre jet spare parts or anticipated the need for increased production and shipment along the logistics pipeline. By blindly accepting civilian production patterns based on steady rates of consumption, the Air Force left itself open to vital spare parts shortages in war. The Air Force wrongly assumed that steady, long-term production would be adequate for war, but since war is not "normal," military production must accommodate accelerated rates of use and change.

In the second example, centralized control caused the ineffective flow of supplies to Pusan during the Korean War, and aggravated our inability to properly identify critical supply items. On the upside, mobilization provided war material for U.S. forces in Korea at a tremendous rate via sealift. The sheer volume of cargo unloaded at Pusan attests to the effective flow of the logistics mobilization pipeline. But relying on centralized control works best within limited parameters. It works best in civilian industries, where rates of supply rely on the steady consumption of a known system; it works best in the

limited communication and distribution network of a single company or even a chain of industries; and it works best in a slow-tempo environment, which makes feedback and the proper identification of incoming and outgoing shipments easier. War, however, is different. Consumption rates fluctuate wildly, communication and distribution networks are not limited, and the tempo of activity can be frantic. Korea reflected each of these traits, but military logisticians continues to copy civilian practices when they actually needed to modify the centralized approach used by civilians.

In the Pusan example, favoring traditional logistics methods over the rapid movement of supplies was only partially successful. It had three glaring weaknesses: poor feedback, unclear identification of shipments, and no procedure to airlift (or at least spotlight) critical items. Feedback was the most important missing element. Without it, centralized logistics control could only do half the job. Civilian mobilization techniques got the assets to Pusan, but a mobility-oriented distribution plan would certainly have shortened a two-year backlog.

Despite the inadequacies outlined in the examples from Korea, mobilization-based logistics derived from civilian management techniques were eventually satisfactory, if not efficient. During the 1960s and early 1970s, the Air Force continued to adopt civilian practices that fostered a reliance on mobilization.

Institutionalization Phase

For the most part, civilian management techniques that favored mobilization over mobility continued to perform satisfactorily during the 1960s and early 1970s. As a war based on long-term mobilization, Air Force operations in Vietnam benefited from the techniques applied in the next example. Systems analysis did enabled Air Force logisticians to identify inadequacies in the logistics pipeline.

Systems Analysis and Vietnam Logistics, and Logistics Lessons from Vietnam: In the example dealing with the slow movement of in-theater airlift and the subsequent effects on aerial port cargo flows, systems analysis revealed that while the Air

Force's mobilization-oriented logistics system was moving assets to the theater adequately, ineffective use of airlift in-theater was disrupting the final stage of the logistics pipeline. Fortunately, the appropriate application of systems analysis kept the Air Force from making the same mistake that logisticians in Korea had made at Pusan. And by applying the civilian management technique of decentralized execution, the Air Force solved the problem quickly.

But it still remains that an increased emphasis on mobility would have improved logistics operations in Vietnam. Our analysis of Vietnam-era acquisition practices demonstrated how a greater emphasis on mobility would have improved logistics support and combat operations. In the case of General Patch's Southeast Asia logistics after-action report, in which any discussion of mobility issues affecting Air Force logistics operations during Vietnam were glaringly absent, moderate logistics success bred inertia when it came down to evaluating logistics effectiveness in Southeast Asia. The evaluation was almost purely based on mobilization issues because those were the parameters within which civilian industry was operating. Unfortunately, wartime contingencies involved situations which civilian mobilization applications could not resolve as effectively as a mobility approach. Instead of looking outside the boundaries circumscribed by mobilization, "Southeast Asia Logistics 1964-1971" left the Air Force with only one clue -- Special Assignment Airlift Missions -- about how to apply mobility in the next conflict.

The civilian management practices adopted by the Air Force during the institutionalization phase of the military-industrial complex enhanced mobilization logistics, but did little to foster improvement or reliance on mobility-oriented logistics. The 1980s, however, would bring changes to both the civilian and military world, changes which would make it mandatory for Air Force logisticians to reconsider the importance of mobility.

Divergence Phase

The development of the Rapid Deployment Joint Task Force in the early 1980s marked the point at which Air Force logistics began to suffer significantly from the growing divergence between the methods used by the military-industrial complex and those used by civilian industry. The military-industrial complex was still supporting mobilization when civilian industry turned to mobility.

Task Force Approach and the CMMS, and JOPS and Desert Shield/Storm: The first example cites how the Congressionally Mandated Mobility Study attempted to apply a civilian management technique -- the task force approach -- to discover where airlift shortfalls lay and to recommend potential solutions like the C-17 to the strategic mobility problem. The application of this particular civilian management technique was good in that it pinpointed exactly what the shortfall was in terms of how many tons of equipment the Air Force was actually capable of moving versus how many tons it needed to be able to move to meet mobility requirements. Too, the corroboration provided by RDJTF exercises running simultaneously with the mobility study validated its findings.

What was not good is that the CMMS task force was not in a position to implement solutions. In civilian industry, task forces commonly provide recommendations for solutions with a strong degree of assurance that their plans will come to fruition. They are empowered by the industry leaders to effect change. The CMMS made the mobility-supportive recommendation to acquire the C-17, but Congress refused to fund it. In this example, a half-implemented civilian management technique did not yield results: the Air Force had a strong case that its strategic mobility airlift was insufficient, but it did not develop a plan to remedy the situation. As a result, the RDJTF operated with inadequate airlift in Desert Storm. Only a five and one-half month grace period (allowed by the aggressor and not to be expected to recur) permitted a hybrid of mobilization and mobility techniques -- sealift and airlift -- to prepare the Air Force for war.

In the Joint Operation Planning System example, which described how JOPS was unable to function satisfactorily in the complex, changing environment of Desert Shield/Storm, we return to systems analysis and see how the Air Force's dependence on this civilian management technique missed the mark. JOPS is a wide-ranging system requiring complex computer support. The Air Force, in concert with other services, had invested deeply in its success, as had the manufacturers who provided the systems. JOPS seemed to promise an effective way to sort people and assets for mobility deployment. But it had only been tested under controlled exercise conditions, which did not push the system any more than RDJTF exercises really tested strategic mobility airlift capability. Neither the military industrial complex who provided the system nor the defense establishment that bought it had any wish to see JOPS fail.

Yet the Desert Shield/Storm experience proved that JOPS could not cope with the myriad of changes implicit in war. In this example, failure of the JOPS system forced Air Force logisticians to jury-rig or ignore it in order to provide greater mobility in deploying assets to Saudi Arabia. Inevitably, this jury-rigging caused problems like backlogged aerial ports. In a sense, the Air Force was recreating the port problems of Korea and Vietnam, but with a more efficient system. Had the Air Force executed the mobility plans exactly as programmed, in terms of both time and content, (an unrealistic goal in war) JOPS might have been adequate, but this is not certain. Still, even though the JOPS system does not accommodate the degree of flexibility mobility needs, it is probably the most efficient mobilization system to date.

Summary

The preceding analysis shows a number of problem areas which Air Force logisticians need to address in order to achieve a more appropriate balance between mobility and mobilization. Particularly, shortfalls have historically existed in mobility readiness, spares resupply and timeliness of spares acquisition. Further, the Air Force's continued reliance on civilian management techniques and concepts has increasingly led

it away from the cutting edge of logistics technology. In the following chapter, we will focus on five suggested strategies to repair the damage already done.

Chapter 4

Suggested Strategies

"The Arms Race may be over, but the package race is just heating up"

United Parcel Service Commercial, May 1993

The Air Force's commitment to improved mobility is evident after Desert Shield/Storm. In the upcoming Vulcan Force 93 planning exercise, scheduled for 4-8 October 1993 at Maxwell Air Force Base, Air Materiel Command will use war games to focus on a new paradigm: Deployability versus Performance.[1] The exercise will help forecast the technological systems needed for the future, but it will not focus on the organizational changes or on the integration of existing civilian technologies and methods that we also require.

The preceding historical review and analysis points out that the current condition of Air Force logistics, which favors long-term development over rapid mobility, did not occur by revolution, but by evolution. The shifting of the balance back towards mobility should also be an evolutionary process, for three reasons. First, an evolutionary approach allows gradual modification and refinement of new systems and approaches. Second, a radical, revolutionary approach could shift the balance so far in favor of mobility that the advantages of the mobilization approach, which are very real, could be lost[2]. Finally, and of most consequence to this argument, an evolutionary approach allows Air Force logisticians to begin to implement mobility strategies on a limited scale, expanding their application as they prove successful.

The suggested strategies that follow are actions that may be implemented on a limited scale to foster a heightened awareness of and improved capability for mobility. Some of the suggestions have already been tested at the unit level, and their success suggests that wider application is appropriate. Ideally, this incremental refinement

approach will improve awareness of the growing importance of mobility, and will engender new and improved strategies on how best to supply widely deployed air units.

The suggested strategies outlined here fall into two categories. The first includes organizational changes in Air Force logistics activities directly related to mobility: depot level maintenance and War Reserve Spares Kit management. The second covers changes that integrate currently successful civilian technologies and methods: the integration of civilian express shipping technology and application of Total Quality Management techniques to mobility problems.

The wing is the fighting unit of the Air Force; it is the wing's job to fly and fight. However, the predominant workload of the Air Force is to maintain its assets and to deploy them when necessary. The place where we can make the most impact, the most improvement in our ability to project power, is at the depot level. By refining our depot procedures, by managing our airpower assets with power projection (deployment) in mind, Air Force logisticians can deliver to the battlefield a more effective fighting force.

We will first examine how the Air Force can apply combat or C-ratings as a tool for enhanced mobility capability.

Suggested Organizational Changes

Three-level Wing C-Ratings: The Air Force should adopt a three-level wing C-rating (combat rating) system to evaluate the wing's overall combat capability, the percentage of War Reserve Spares Kits at the depot for repair, and the depot's ability to repair and return parts to the wing during wartime.

The Air Force is now in the process of changing from a three-level maintenance system to a two-level maintenance system. Under the old system, level one maintenance was performed on the aircraft while it was on the flightline and included removing and replacing parts or "black boxes;" level two maintenance was performed in avionics, jet engine and hydraulics maintenance shops and included changing components in black boxes or repairing some parts; level three maintenance, in turn, occurred at the depot and

included repairing/rebuilding black boxes and major aircraft repair/refurbishment. The new two-level maintenance system eliminates the intermediate level -- maintenance will occur either on the flightline (remove and replace) or at the depot.

Although this new system represents a manpower savings at the wing level, it also presents challenges in wartime. Previously, a wing deployed with its intermediate-level maintenance teams. Now, the ability to perform extensive repairs has moved from the field to the depot. Consequently, a much greater part of the wing's combat capability now rests with the depot's ability to repair parts and ship them back to the fighting unit as quickly as possible..

Currently, wings commonly “cannibalize” parts out of their WRSK to enable them to maintain the highest C-ratings per squadron possible. A wing with three squadrons may cannibalize the WRSK for Charlie squadron to keep Alpha and Bravo at the highest possible level (C-1). This is permissible as long as the wing maintains “due out” orders on file for the parts removed, which confirms that the wing has taken action to replace them. However, if a large number of “due out” slips have replaced actual WRSK parts, or if the depot is unable to readily ship replacements, the wing could be unprepared to deploy on short notice, even with a C-1 rating.

One possible solution to this problem is a three-level C-rating system based on a wing's wartime mission statement. The first C-rating would assess the wing's overall combat capability (which includes flying hours, manning, training, safety and administrative requirements). The next two C-ratings, however, would be shared by the wing and the depot assigned to support it.

The first shared C-rating would assess the wing's ability to deploy with its 30-day WRSK intact. It would measure the percentage of WRSK parts on “due-out” to the depot and the expected turn-around time from the depot to the wing. Air Materiel Command would have to develop precise standards, but as an example, a wing which had 90% of its WRSK on-hand and a depot turn-around-time of 10 days could conceivably have a

shared C-1 rating in this area. On the other hand, a wing with 75% of its WRSK on-hand and a depot turn-around time of 25 days might share a C-2 rating.

The second shared C-rating would measure the time it would take the depot to resupply a 30-day WRSK for a wing already deployed into combat. Depot logisticians would have to view the stock they have on-hand, repaired and ready to ship or awaiting repair, not merely as a collection of parts, but as a follow-on WRSK. This complete 30-day WRSK resupply kit is what they will need to replenish units in the field.[3]

The advantage of a three-level C-rating system is that it encourages both the wing and the depot to think in terms of mobility while operating under peacetime conditions. Currently, a wing may be C-1 and still be unready to deploy. The three-level C-rating system would unmask "paper tigers" as far as logistics mobility capability is concerned, both in terms of immediate deployment readiness and in maintaining the wing's combat readiness in the field. Finally, this system recognizes and validates the responsibility for readiness shared by the wing and its supporting depot.

The Air Force should implement this new system through a pilot-study using at least two wings. This would allow a measure of control to avoid assuming one wing's unique problems apply universally. This test application would also allow the Air Force to gather data in three key areas. 1) Does shared responsibility improve communication between the wing and the depot? 2) Do cannibalization rates decrease under this system? 3) Can the wing and/or the depot add or adjust funding to supply the increased p[arts the new system requires? Two major pitfalls exist. First, shared responsibility could lead to shifting "blame" for inadequate WRSK between the wing and the depot. Second, if the system calls for increased funding for spare parts, the Air Force could be left with merely an improved "heads-up" system if Congress does not provided the funds.

Self-Contained 30-Day War Reserve Spares Kits: The Air Force should seek to create a truly mobile, self-contained 30-day WRSK by using deployable containers,

deployable munitions storage racks, and B-52s in a ferrying capacity for the racks and munitions.

Most units store their WRSK in a variety of containers, from wooden crates to cardboard boxes. When it's time to deploy, the collection of boxes and crates that hold the WRSK go on 463L pallets, wrapped in plastic, netted, and loaded. Though some WRSK pallets are stored wrapped and ready to ship, many are built only after the wing receives the order to deploy. Sometimes a unit's WRSK pallets become separated in shipment, causing maintenance delays and general inconvenience. This loose WRSK is also subject to pilferage and breakage, both at the home station and while in transit.

Deployable containers are one way a unit can consolidate its WRSK, protect it, and make it easy to ship. AAR Brooks and Perkins deployable containers, built by Cadillac Manufacturing Division, Cadillac, Michigan, provide a secure, weather-resistant system for transporting WRSK.[4] These highly damage-resistant containers come in a variety of sizes and may also be custom-designed, although the ready-made line includes containers specifically made for current Air Force aircraft. Complete containerization of WRSK is not possible because hazardous cargo like munitions, explosives and certain chemicals require special, separate shipment, and because some oversized WRSK items (such as C-130 props) will not fit in the containers. Still, a wing can ship 90% of its WRSK in these containers if shippers consolidate hazardous and oversized cargo.[5]

The Air Force approved limited experimental use of these containers in February 1990.[6] During Operation Desert Shield/Storm, the 314th Logistics Group deployed the 1620th Tactical Air Wing (Provisional) to Batine, United Arab Emirates, using the AAR Brooks and Perkins system. According to the squadron commander, the system saved the wing four hours during initial deployment because the containers were so easy to fill and load; they made the difference between a chaotic deployment and an orderly move.[7] Further, the system contributed directly to a utilization rate of 3.84 and a surge rate of 7.8. because the deployable containers enabled the wing to ship most of their spare parts

together and protected the parts from damage. Thus, wing maintenance was able to keep the aircraft airborne for combat.[8]

Desert Shield/Storm proved the value of deployable containers. The Air Force should expand the use of this system service-wide for unit WRSK in order to enhance mobility capability. As a final recommendation, each depot should store follow-on WRSK for its supported wings in these same containers. During deployments, this containerized WRSK should be shipped as a complete set to the deployed wing where it would be swapped out with the expended 30-day WRSK, saving on airlift and eliminating piecemeal WRSK resupply.

The deployable containers should also be used at the depot level to hold standardized WRSK packages to resupply a deployed wing. Under this remove-and-replace WRSK system, the containerized resupply WRSK could be deployed to the forward wing and swapped out with the depleted container(s) that held the initial 30-day WRSK. This would save airlift, as the WRSK exchanges could be scheduled as complete missions and eliminate the piecemeal resupply suffered in Desert Shield/Storm.[9]

The Air Force has not implemented the deployable container system because mobility has a much lower priority than day-to-day issues like flying hours. The Air Force's mobilization-oriented approach to logistics blinded it to an obvious fix for a critical mobility problem. Even when the fix was successfully implemented in a very limited way, the mobilization bias has held the Air Force back from committing funds to a system which has proven to enhance mobility capability and improve combat capability.

One problem repeatedly voiced by wing logisticians is the need to deploy enough munitions to sustain a wing in combat for 30 days. Here, a variation on the deployable container system may prove effective. Under present practices, munitions are packed and crated much like WRSK spare parts. Because these munitions take up an inordinate

amount of airlift space, the current solution is to preposition munitions on ships, where sealift can have the weapons to the units in the field within weeks.

However, with the advent of "smart" weapons, wings need fewer munitions. If the Air Force developed or contracted for compact and sturdy deployable racks for munitions storage in the field, the bombs and the storage racks could be initially deployed using B-52s in a ferrying role. The advantages are several. First, the move would free up AMC airlift, reducing to some degree the current airlift shortfall. Second, the plan would expand the use of the vintage B-52 fleet. Finally, and most important, this action would insure that the deployed wing would be self-sustaining and combat ready in a shorter period of time.

Integration of Civilian Technologies/Methods

Integration of Civilian Express Shipping Technology: The Air Force should fully adopt existing computerized bar code scanning technology used by civilian express shipping companies, such as Federal Express, to improve air mobility.

Desert Shield/Storm showed out that wartime resupply problems that existed in the 1950s and 1960s still exist. The Joint Operation Planning System is not fast enough or flexible enough to handle and track WRSK deployment or resupply. Additionally, the Air Force has invested millions of dollars in this complex, integrated system; total system redesign would be costly and take too much time. Yet it would seem logical that an Air Force that sees the benefit of remove-and-replace avionics packages, designed so that failure of one component does not mean depot repair of the whole system, might develop a similar approach for the JOPS system.

Federal Express currently uses a computerized tracking system that enables its people to know the location of a package at any time in the life cycle of the shipment, from pickup to delivery. The information system, COSMOS IIB, combines bar code scanning, near real-time data transmission and personal accountability to insure on-time delivery.[10]

The process uses a hand-held computer called the SuperTracker. The courier picks up the package and, using the SuperTracker, assigns it a bar code, which contains the delivery time required, hazard information and destination zip code. The user inserts the SuperTracker into a portable printer, which prints out the label alpha numerically and in a bar code. The label also contains a SuperTracker-computed routing code (both alpha numeric and bar coded) based on the package's origin and destination. Following pickup, the user inserts the SuperTracker into a Digitally Assisted Dispatch System (DADS) computer in the courier's van; DADS transmits the information via radio to the local dispatch center. From there the data is transmitted to COSMOS.[11] Once the courier arrives at his dispatch center, he unloads the packages onto a belt which leads to containers. Employees sort the packages by routing code into the appropriate container, scanning each package with the SuperTracker. This tells Federal Express that the package was, in fact, loaded into a container and who loaded it. Again, the SuperTracker information is transmitted to COSMOS. Federal Express then sends the containers to a sort facility; again the user scans the package with the SuperTracker as employees load the package for transport to the destination station. Employees scan the package a fourth time at the destination station. As couriers move the packages from the destination station belt to their vans, they scan each package again. En route, the courier transfers the SuperTracker information into the DADS computer. Finally, upon delivery, the courier scans the package a sixth time. The courier enters the recipient's last name and first initial into the SuperTracker.[12] He also enters whether the addressee was the recipient and any further information unique to the delivery. [13] Finally, if at any time the DADS computer is down, the courier can acoustically transmit the SuperTracker information over regular telephone lines.[14]

The advantage of such a system to Air Force logisticians is obvious. During wartime, a wing's ability to fly and fight depends on the logistics pipeline. In the past, we have jury-rigged the various systems operating at the time (such as the spare parts

resupply pipeline during Desert Storm) because they could provide neither reliability nor accountability. The Federal Express system provides both: reliability in knowing exactly where at every given moment a critical shipment is, and accountability in knowing which individuals handled the item at key points in the shipment process. Aerial port personnel using hand-held bar code scanners could, at the very least, avoid costly reshipment of lost items. More optimistically, such a system, especially if combined with deployable containers, would help solve two fundamental problems: misrouted shipments and unidentified shipments, both of which were problems during Desert Shield/Storm.[15]

The similarities between the mission of Air Force mobility logistics and that of Federal Express are twofold: service to the customer and the nature of the product. Chris P. Demos, Federal Express Technical Business Advisor, puts it this way:

> There are two facets of this that have to be pointed out. First, of course, is the value of the information to the customer, which is critically important. People may say, "You guys are so reliable, I don't need to call. Don't scan; lower your prices." Now this is the shipper talking. First of all, we get 350,000 phone calls every single day in our call centers. One hundred fifty thousand of them are inquiries. We get another more than 350,000 inquiries electronically. We ship 1,600,000 to 1,800,000 packages a day. That means that one in four packages has a inquiry associated with it. Somebody cares.
>
> But the real hook, the reason they don't think they have to call us, is because of the scan, because the scanning is an in-process quality control system. The point we try to make is, service companies, unlike our brothers and sisters in the manufacturing end of business, don't have the luxuries that they have. They can make a car, or whatever, and they can build these fancy-schmancy factories with state of the art robotics with end-process quality control systems and statistical analysis. But at the end of the line, they still have the option not to ship it. Our "product" is manufactured essentially all over the country. When we pick up the phone and answer a call, that is "the chassis." So how we answer that call counts. We're the final assembly of our product, right in front of the customer. There is only one "10:30 delivery" in the life of this product. If we miss

that “10:30,” there isn't another one. The product is “10:30.” It's the commitment.[16]

For Air Force logisticians, service to the deployed wing is also vitally important. And like Federal Express, aircraft scheduled for an air strike have only one “10:30.” Failure to deliver the logistics product could have implications far greater than a dissatisfied customer.

The Air Force knows that this system works. Federal Express owned and operated one-third of CRAF cargo planes operating during Desert Shield/Storm.[17] With the COSMOS/SuperTracker system, Federal Express ships more than 300 million packages a year.[18] Air Force officials have visited Federal Express facilities repeatedly;[19] ten years ago, a study recommended subcontracting with Federal Express for European delivery.[20] Considering the documented inadequacies of the current system, it is time for the Air Force to rethink implementation of off-the-shelf computerized bar code scanning technology for mobility logistics.

Finally, we will examine how a civilian management technique already in use by the Air Force might enhance air mobility.

TQM for Mobility Paradigms: The Air Force should make a conscious commitment to apply Total Quality Management (TQM) to improve its mobility capability.

Air Force logisticians, under the auspices of Air Force Logistics Command (now Air Force Material Command [AFMC]) has been using TQM since the mid-1980s, with great success. TQM is now mandated throughout the Air Force as the method for achieving quality in how it accomplishes its mission. AFMC has won both the 1991 President's Award for Quality and Productivity Improvement and the 1992 Federal Quality Institute Quality Improvement Prototype Award. The mobility programs that contributed to the awards included a successful initiative to improve F-15 and F-16 depot turn-around repair time.[21] and a low-cost Global Positioning System that enabled the

4950th Test Wing to deliver 2.1 million pounds of equipment during Desert Shield/Storm.[22]

The fact that mobility initiatives were components of award-winning TQM cultures points out that the Air Force is beginning to use TQM to improve mobility. But more is needed. First, the Air Force should make improving the mobility process a TQM priority. Top-down commitment to mobility initiatives that have already been developed through TQM is a good beginning because it encourages people to apply creative and innovative thought to mobility problems, but alone it is not enough. The Air Force must make mobility a TQM priority, deliberately focusing time and attention to this particular issue.

The second step the Air Force must take to improve mobility capability through TQM is to publicize results. Currently, the AFMC Quality Center does not formally track quality initiatives that the command has implemented either at its headquarters or its wings. There is no large data base that captures quality improvement team activities, nor is there a computerized method for sharing team results.[23] The Air Force must create an information sharing system to communicate quality initiatives that improve mobility. A TQM mobility initiative computer data base, maintained at AFMC, could contain, at a minimum, the subject of the initiative and the location where the Air Force successfully implemented the initiative. Periodic updates distributed Air Force wide could both avoid duplication of effort and serve to trigger new ideas or improvements on existing initiatives.

Summary

The preceding strategies are a point of departure for improved logistics mobility. Both the organizational changes and the recommended application of civilian technology and methods take an evolutionary approach. Thus, the four strategies outlined here -- three-level wing C-ratings, self-contained 30-day WRSK, integration of civilian express shipping technology, and application of TQM to mobility paradigms -- continue the

historically established practices of developing weapon systems and adopting civilian management concepts and techniques. By gradually shifting their emphasis from long-term development programs air mobility, logisticians can instill a greater awareness of the critical value of mobility while avoiding sweeping changes that might weaken our defense industrial base.

Notes

[1]Briefing by Eric Werkowitz, Air Force Material Command, Wright-Patterson AFB, Ohio, 19 April 1993.

[2]Air Force Chief of Staff Video, "Global Reach/Global Power, Two Types of Change," Gen Merrill A. McPeak, February 1993.

[3]The new two-level maintenance system requires that the depot maintain more parts than the old three-level system because there must be a steady flow of parts between the unit and the depot, in addition to those parts under repair. The follow-on parts should not be stored on warehouse shelves, but in consolidated WRSK, ready to deploy. Under this system, a depot would have as many C-ratings in this area as wings supported.

[4]AAR Brooks and Perkins Cadillac Manufacturing Division: Action Containers and Pallets (Marketing Brochure), 201 Haynes St., P.O. Box 550, Cadillac, Michigan 49601-0550.

[5]Interview with SSgt Phillip W. Russell, 314th Tactical Air Wing, 314th Logistics Group, Little Rock Air Force Base, AK, 12 April 1993.

[6]Headquarters Military Airlift Command Message, "WRSK Mobility Containers," 131530Z, February 1990.

[7]Interview with Maj Gary L. Elliot, Logistics Support Squadron Commander, 1620th Tactical Air Wing (Provisional), 314th Logistics Group, Little Rock Air Force Base, AK, 12 April 1993.

[8]Ibid.

[9]The current problem hindering development of standardized, self-contained WRSK (other than recurring parts shortages and depot funding) is the old problem of aircraft at different locations breaking at different rates, with varying systems being affected. New computer software, however, may soon help Air Force logisticians manage this problem more effectively. Based on artificial intelligence studies that seek to create computer programs that mimic the human brain, these programs learn from their mistakes (neural network programs), find pattern in seemingly random events (chaos theory) and identify and handle anomalies while making judgments about the suitability of alternatives (genetic algorithms). Kerr Steamship Company of Cranford New Jersey is currently using an artificial intelligence system to find the cheapest means of transporting inland cargo ("The New Rocket Science, Business Week, 2 November, 1992, p. 131-154). The implications of such a system to determine the most effective mix of parts for wing WRSK could mean decrease in resupply times and reduced airlift.

[10]American Management Association, Blueprint for Service Quality: The Federal Express Approach (New York: American Management Association Publications, 1991) pp. 58-60.

[11]COSMOS handles 18-20 million transactions daily.

[12]Interview with Chris P. Demos, Technical Business Advisor, Technical Services Division, Federal Express, 2831 Airways Dr., Memphis, Tennessee, 3 May 1993.

[13]Federal Express employee Chris P. Demos recounted an incident in which a customer called to complain that an urgently-needed package had not arrived. The customer service representative consulted COSMOS and, within fifteen seconds, advised the customer to look under the front porch steps. Using SuperTracker, the courier had informed COSMOS that it had been raining at the time of delivery and he had placed the package where it wouldn't get wet.

[14]Interview with Danny Peppers, Courier, Federal Express, 2772 Gunter Park Dr. East, Montgomery, Alabama, 5 May 1993.

[15]My personal experience during Desert Shield/Storm bears this out. While at a forward operating location, I was informed that an inbound KC-135 contained critical B-52 WRSK, slated for delivery according to the JOPS airflow plan. I was both surprised and dismayed when the hatch opened and revealed a plane full of chaplains and softball equipment.

[16]Demos interview, 3 May 1993.

[17]Blueprint for Service Quality, p. 10.

[18]Ibid.

[19]Demos interview, 3 May 1993.

[20]Richard G. Poff, "The European Distribution System -- Is there A Better Alternative?" (Research report, Air Command and Staff College, Maxwell AFB, Alabama, 28 March 1983)

[21]Air Force Logistics Command, "Application for the President's Award for Quality and Productivity Improvement," Wright-Patterson AFB, Ohio, 19 February 1991, p. 39.

[22]Air Force Logistics Command, Aeronautical Systems Center, "Paradigms Lost: Aeronautical Systems Center, Toward New Horizons," Wright-Patterson AFB, Ohio, 1992, p. 38.

[23]Interview with Wanda Mitchell, Quality Instructor, Center for Quality Education, Air Force Material Command, Wright-Patterson Air Force Base, Ohio, 29 April 1993.

Chapter 5

Conclusion

Logistics in the Air Force is composed of two parts: mobilization and mobility. Air Force logisticians have created an imbalance over time by favoring long-term weapon system development over the ability to move aircraft and supplies. Historically, this imbalance has been due to 1) a desire to acquire the airframes and supporting equipment needed for independent Air Force roles and missions, and 2) civilian industrial management concepts and techniques adopted by Air Force logisticians. The evolving military-industrial complex helped create an airpower logistics system over three periods -- the 1950s (codification), the 1960s and early 1970s (institutionalization), and the post-Vietnam era (divergence) -- that has served us well in terms of long-term mobilization but has created shortfalls in our ability to deploy anywhere, any time.

The challenges that will face the Air Force in the future require more than mobilization can satisfy. The probable recurrence of contingency operations like Desert Shield/Storm demands that the Air Force be able respond immediately, and be fully combat ready. To effectively support this Global Reach/Global Power vision, the Air Force must strengthen the focus on mobility, thus creating a balance between mobilization and mobility. To effect this shift, it is essential that the Air Force institute organizational changes and integrate current successful civilian technologies and methodologies into our logistics structure. These changes include three-level wing C-ratings, self-contained 30-day War Reserve Spares Kits, integration of civilian express shipping technology, and Total Quality Management applied to mobility problems.

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